

Application No.: 09/980,880
Appeal Brief Dated: September 23, 2008

MAT-8189US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appln. No: 09/980,880
Applicants: Yoshio GODA, et al.
Filed: September 3, 2002
Title: TOP SEALING PLATE, BATTERY USING THE TOP SEALING PLATE,
AND METHOD OF MANUFACTURING THE BATTERY (AS AMENDED)
TC/A.U.: 1745
Examiner: Robert W. Hodge
Confirmation No.: 1394
Docket No.: MAT-8189US

SUBSTITUTE APPEAL BRIEF

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Responsive to the Notification of Non-Compliant Appeal Brief dated August 29, 2008, this Substitute Appeal Brief is being filed.

I. REAL PARTY IN INTEREST

The Real Party In Interest in this matter is Matsushita Electric Industrial Co., Ltd.

II. RELATED APPEALS AND INTERFERENCES

There are no appeals or interferences known to Appellant, Appellants' legal representative, or Appellants' Assignee that will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1-5, 9, 10, and 12-29 are pending in the application. Claims 1-3, 5, 9, 10, and 12-29 stand rejected under 35 USC 103(a) as being unpatentable over Onagawa, Japanese Patent Abstract H08-273,649 ("Onagawa") in view of Nishino, Japanese Patent Abstracts H08-339,785 ("Nishino"). Claim 4 stands rejected as being unpatentable over Onagawa in view of Nishino and further in view of Ishizuka, U.S. Patent 6,019,802.

IV. STATUS OF AMENDMENTS

The dates that Amendments have been filed, and their respective status are as follows:

<u>Date</u>	<u>Status</u>
June 30, 2005	entered
October 20, 2005	not entered
December 2, 2005	not entered

The Claims Appendix to this Brief reflects the amendment filed on June 30, 2005.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The specification discloses a top sealing plate for a battery, a battery comprising the top sealing plate, and a method for the manufacture for the battery comprising the top sealing plate. Specification, Title, Abstract.

Claims 1, 12, 14, 16, and 23 are independent claims. Claims 1, 12, and 14 are drawn to a top sealing plate used for a battery. Claim 16 is drawn to a battery. Claim 23 is drawn to a method for manufacturing a battery.

Independent claim 1 and dependent claims 2-3, 5, 9, and 10, directly or indirectly dependent thereon, are drawn to a top sealing plate used for a battery. The top sealing plate comprises a filter, a cap, and a valve body. Specification, page 5, lines 7-8. Figure 1(a) and Figure 1(b) show top sealing plate 22, comprising filter 3, cap 11, and valve body 12. *Id.*, page 19, lines 15-17. Filter 3 has an upper opening formed in the top surface thereof, and valve hole 9 formed in the bottom surface thereof. *Id.*, page 19, lines 17-19. Cap 11 comprises convex portion 6 and flange portion 14, disposed around convex portion 6. *Id.*, page 19, lines 22-24. Cap 11 is disposed so as to close the upper opening of filter 3. *Id.*, lines 20-21. Filter 3 has a dish-shape, and in the center of filter 3 is formed valve hole 9. *Id.*, page 19, line 25, page 20, 1. When gas is generated in the battery, it is discharged through valve hole 9 and gas vent hole 10. *Id.*, page 20, lines 1-3. Cap 11 and filter 3 are made of electrically conductive materials, such as metals. *Id.*, lines 3-5.

Caulked portion 13 is formed by the upper opening end of the filter 3 and the outer periphery end of flange portion 14 of the cap 11. *Id.*, page 22, lines 1-3. The upper opening end of the filter 3 includes a bend portion that is inwardly bent, which is caulked while the outer periphery end of the flange portion is positioned in the bend portion. *Id.*, page 22, lines 3-8. Caulked portion 13 is formed by the upper opening end of the filter 3 and the outer periphery end of flange portion 14 of cap 11. *Id.*, page 22, lines 1-3. Valve body 12 is disposed in top sealing plate 22 so as to close valve hole 9. *Id.*, lines 19-20. Flange portion 14 of cap 11 and the filter 3 are in a state of contact including a strong contact portion and a weak contact portion. *Id.*, page 28, lines 2-4. Outer periphery end of flange portion 14 includes projection 31 formed on the surface or back of the outer periphery end of flange 14. *Id.*, page 20, lines 6-7. First contact portion is formed from the contact of the projection and the bend portion of filter 3. *Id.*,

page 28, lines 4-7. Cap 11 and filter 3 are electrically connected to each other by the contact of the outer periphery end of flange 14 and the bend portion at the caulked position. *Id.*, page 7, lines 2-4. Figures 3(a) to 3(d) show cap 11 that includes flange portion 14 formed around convex portion 6. *Id.*, page 21, lines 1-3. Gas vent hole 10 is formed in flange portion 14. *Id.*, page 19, lines 24-25. As recited in claim 5, projection 31 comprises at least one of a plurality of small projections 16, a plurality of bulges 15, and peripheral edge 17 extending from the outer periphery end. *Id.*, lines 7-10. As recited in claim 9, projection 31 is formed on the surface or back of the outer periphery end of flange 14.

Independent claim 12 and dependent claim 13, dependent thereon, are drawn are a top sealing plate used for a battery. The sealing plate of claim 12 is similar to that of claim 1. However in claim 12, the distance from mating face 23 of filter 11 and cap 3 to the peak of projection 31 is greater than the thickness of said flange portion 14, and each of the peaks has a stronger contact pressure against the bend portion of filter 11 as compared with zones other than the peaks. *Id.*, page 16, lines 13-18.

Independent claim 14 and dependent claim 15, dependent thereon, are drawn to a top sealing plate used for a battery. The sealing plate of claim 14 is similar to that of claim 1. However in claim 14, caulked portion 13 includes an integral projection such that outer periphery end and the bend portion are integrally projected; the integral projection is formed by pressing a protuberant tool from above the bend portion, in a state that said outer periphery end is positioned in said bend portion; and the integral projection has a stronger contact pressure as compared with zones other than the integral projection. *Id.*, page 16, line 19, to page 17, line 1.

Independent claim 16 and dependent claims 17-22, directly or indirectly

dependent thereon, are drawn to a battery. Referring to Figure 2(a), the battery comprises battery case 1, a group of electrodes 26, collector plate 27, top sealing plate 22, positive electrode lead plate 8, and gasket 7. *Id.*, page 20, lines 11-14. As shown in Figure 2(b), top sealing plate 11 has a structure shown in Figure 1 and discussed above. *Id.*, page 20, lines 14-15.

Independent claim 23 and dependent claims 24-29, directly or indirectly dependent thereon, are drawn to a method of manufacturing a battery. The method comprises the steps of (a) disposing a positive electrode, a negative electrode, and electrolyte in a battery case; (b) manufacturing a top sealing plate; (c) electrically connecting said filter and said positive electrode; and (d) disposing said top sealing plate at the opening of said battery case via an electrical insulating gasket in order to close the opening. *Id.*, page 13, line 23, to page 14, line 7. The step of manufacturing said top sealing plate comprises the steps of (1) forming a filter having a valve hole and upper opening; (2) bending the opening end of the upper opening of said filter, to form a bend portion; (3) forming a cap having a convex portion and a flange portion disposed around said convex portion; (4) caulking to join the outer periphery end to said bend portion while the surface and back of the outer periphery end of said flange portion of said cap are positioned in said bend portion, to form a caulked portion; and (5) disposing a valve body serving to cover the valve hole in a space formed between said cap and said filter. *Id.*, page 14, lines 10-21.

The step of forming the cap includes forming a projection at the outer periphery end of the flange portion, in which the projection extending from at least one out of the surface and the back thereof. *Id.*, page 25, lines 14-17. The step of forming said caulked portion includes a step of electrically connecting said cap and said filter to each

other by contacting the outer periphery end at said caulked portion with said bend portion so that said caulked portion includes a first contact portion and a second contact portion between the surface of the outer periphery end of said flange and said bend portion, a contact pressure of said first contact portion is stronger than a contact pressure of said second contact portion. *Id.*, page 14, line 22, to page 23, line 4. Claim 29 recites forming the an integral portion by pressing a protuberant tool from above the bend portion while the surface and back of the flange portion of the cap are positioned in the bend portion. Figure 5 shows wedge-like portion 21 where the tip of an upper die 20 of a dies press is pressed against caulked portion 13 at the outer periphery of top sealing plate 22 to deform top sealing plate 22. *Id.*, page 25, line 21, to page 26, line 9.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The rejection of claims 1-2, 5, 9, 10, and 12-29 under 35 USC 103(a) as being unpatentable over Onagawa in view of Nishino, is to be reviewed on appeal.

Although claims 3 and 4 have also been rejected, Appellant concedes the rejection.

VII. ARGUMENT

A. LEGAL STANDARD

The rejection is a rejection under 35 USC § 103(a). Obviousness is analyzed using the four step analysis promulgated in *Graham v. John Deere*, 383 U.S. 1, 17-18, 148 USPQ 459, 467 (1966). However, references must be considered as a whole, and it is well established that it is impermissible to pick and choose only so much as will

support a given position to the exclusion of other parts necessary to the full appreciation of what such reference fairly teaches or suggests. *Bausch & Lomb, Inc. v. Barnes-Hind/Hydrocurve*, 230 U.S.P.Q. 416, 419 (Fed. Cir. 1986).

B. THE REJECTION OF CLAIMS 1-29 UNDER 35 U.S.C. § 112, FIRST PARAGRAPH, HAS BEEN WITHDRAWN

The Final Rejection dated September 2, 2005 rejected all the pending claims under 35 U.S.C. § 112, first paragraph, for allegedly failing to comply with the written description requirement. The December 14, 2005 Advisory Action, however, states that the rejection under 35 U.S.C. § 112, first paragraph has been overcome. Office action of December 14, 2005, page 1, ¶ 5.

C. REJECTION OF CLAIMS 1-3, 5, 9, 10, AND 12-29 UNDER 35 USC 103(a) AS BEING UNPATENTABLE OVER ONAGAWA IN VIEW OF NISHINO

Claims 1-3, 5, 9, 10, and 12-29, all the claims remaining in the application, stand rejected under 35 USC 103(a) as being unpatentable over Onagawa, Japanese Patent Abstract H08-273,649 ("Onagawa"), in view of Nishino, Japanese Patent Abstracts H08-339,785 ("Nishino"). Appellant concedes the rejection of claim 3. For the following reasons, the rejection of the remaining claims should be reversed.

1. The Office Action has not given proper consideration to Claim Limitations

Claims 1-2, 5, 9, and 10

Claim 1 recites, in part, that "said caulked portion includes a first contact portion and a second contact portion between the surface of the outer periphery end of said

flange and said bend portion, a contact pressure of said first contact portion is stronger than a contact pressure of said second contact portion." Claim 1 (emphasis added). The position of the Office Action is that "said limitation is also given little to no patentable weight because it does not further limit the structure of the apparatus." Office Action of September 2, 2005, page 2, last two lines. This is improper.

The Office Actions must consider the invention as a whole; limitations can not be ignored. 35 USC 103(a). Further, the Office Actions have provided no reason or explanation to support the assertion that this limitation does not further limit the structure. This is improper. *See, In re Lee*, 61 USPQ 1430, 1432-34 (Fed. Cir. 2002) (agency findings must be supported by the record).

The Office Action has not made the *prima facie* case. The Office Action has not given proper consideration to a claim limitation. For this reason, the rejection of independent claim 1 and dependent claims 2, 5, 9, and 10, dependent thereon, as unpatentable over Onagawa in view of Nishino should be reversed.

Claims 12 and 13

Claim 12 recites, in part, that "each of the peaks has a stronger contact pressure against said bend portion of said filter as compared with zones other than said peaks." This limitation was recited in claim 12 as originally filed. The Office Action has not given proper consideration to this limitation.

The Office Action has not made the *prima facie* case. The Office Action has not given proper consideration to a claim limitation. For this reason, the rejection of independent claim 12 and dependent claim 13, dependent thereon, as unpatentable over Onagawa in view of Nishino should be reversed.

Claims 14 and 15

Claim 14 recites, in part, "said integral projection has a stronger contact pressure as compared with zones other than said integral projection." This limitation was recited in claim 14 as originally filed. The Office Action has not given proper consideration to this limitation.

The Office Action has not made the *prima facie* case. The Office Action has not given proper consideration to a limitation. For this reason, the rejection of independent claim 14 and dependent claim 15, dependent thereon, as unpatentable over Onagawa in view of Nishino should be reversed.

Claims 16-22

Claim 16 recites, in part, that "said caulked portion includes a first contact portion and a second contact portion between the surface of the outer periphery end of said flange and said bend portion, a contact pressure of said first contact portion is stronger than a contact pressure of said second contact portion." This limitation is recited in claim 1. The position of the Office Action is again that "said limitation is also given little to no patentable weight because it does not further limit the structure of the apparatus." Office action of September 2, 2005, page 2, last two lines.

For the reason discussed above under claim 1, the Office Action has not made the *prima facie* case. The Office Action has not given proper consideration to a claim limitation. For this reason, the rejection of independent claim 16 and dependent claims 17-22, dependent thereon, as unpatentable over Onagawa in view of Nishino should be reversed.

Claims 23-29

Claim 23 recites, in part, that "said caulked portion includes a first contact portion and a second contact portion between the surface of the outer periphery end of said flange and said bend portion, a contact pressure of said first contact portion is stronger than a contact pressure of said second contact portion." This limitation is recited in claim 1. The position of the Office Action again is that "said limitation is also given little to no patentable weight because it does not further limit the structure of the apparatus." Office action of September 2, 2005, page 2, last two lines.

For the reason discussed above under claim 1, the Office Action has not made the *prima facie* case. The Office Action has not given proper consideration to a limitation. For this reason, the rejection of independent claim 23 and dependent claims 24-29, dependent thereon, as unpatentable over Onagawa in view of Nishino should be reversed.

2. The Office Action has not properly considered the Relevant Teachings of a Cited Reference

As recited in claim 1, a caulked portion is formed while the outer periphery end of the flange is positioned in the bend portion. The caulked portion includes a first contact portion and a second contact portion between the surface of the outer periphery end and the bend portion. The outer periphery end and bend portion are "jointed to each other." The outer periphery end includes a projection extending from it. A first contact portion is formed from a contact of the projection and the bend portion. The first contact portion has a contact pressure that is stronger than a contact pressure of the second contact portion.

The Office Action admits that Onagawa does not disclose a projection or a plurality

of projections that are located on the outer periphery of the flange. Office Action of September 2, 2005, page 4, ¶ 10. The position of the Office Action is that Nishino would have made it obvious to include a protrusion in the outer periphery of the flange portion of the Onagawa device in order to improve leakage resistance of the Onagawa battery. *Id.*, page 4, ¶ 12. Appellants respectfully disagree.

Onagawa and Nishino have different purposes. The purpose of Onagawa is to provide a battery whose valve actuating pressure can be stably maintained over a long period of time. Onagawa, Abstract. In Onagawa, the sealing plate 2 is metal and it comes into direct contact with positive electrode terminal 5. *Id.*, ¶ [0006]. A gasket 3 is on the outside of, and partially surrounds, the joined sealing plate 2/electrode terminal 5. *Id.* The purpose of Nishino is to prevent leaking of electrolyte by placing a protrusion 1a on the flange and an improved gasket 3 between the protrusion and the positive electrode case 2. Nishino, Abstract.

Consequently, Nishino requires not only the protrusion, but also the gasket 3. Nishino, Abstract, Purpose. Specifically, the Purpose paragraph states that it operates by "compressing a gasket in a part corresponding to the protrusion by a prescribed compressing rate." Accordingly, in order to obtain improved leakage resistance in the Onagawa device, the Nishino protrusion and the Nishino gasket 3 would have to be incorporated into the Onagawa device. Nishino fails to teach or suggest that improved leakage resistance can be obtained by using only the Nishino protrusion.

If both the Nishino protrusion and the Nishino gasket 3 were incorporated into Onagawa, the newly added gasket would intervene between the newly added protrusion and the bend portion of Onagawa's sealing plate 2. The resulting device would not have a first contact portion "formed from a contact of said projection and said bend portion"

because the protrusion would necessarily contact the gasket, not the bend portion. As a further consequence, the first contact portion would not exhibit the requisite first contact pressure because these would not be a first contact portion "formed from a contact of said projection and said bend portion." Moreover, there would not be "a second contact portion between the surface of the outer periphery end of the flange and said bend portion," thereby precluding a contact pressure at the second contact portion.

References must be considered as a whole, and it is well established that it is impermissible to pick and choose only so much as will support a given position to the exclusion of other parts necessary to the full appreciation of what such reference fairly teaches or suggests. *Bausch & Lomb, Inc. v. Barnes-Hind/Hydrocurve*, 230 U.S.P.Q. 416, 419 (Fed. Cir. 1986) (*citing In re Wesslau*, 147 U.S.P.Q. 391, 393 (CCPA 1965)). See also, *In re Fritch*, 23 U.S.P.Q.2d 1780, 1783-84 (Fed. Cir. 1992) (One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.); *In re Mercier*, 185 U.S.P.Q. 774, 778 (CCPA 1975)(*all the relevant teaching of the cited reference must be considered in determining what they fairly teach to one having ordinary skill in the art*) (emphasis in original). Therefore, the Office Action has incorrectly concluded that it would have been obvious to include a protrusion, alone, in the outer periphery of the Onagawa flange portion in order to improve leakage resistance.

The Office Action has not made the *prima facie* case. The Office Action has improperly reconstructed the invention by picking and choosing only so much as will support the rejection to the exclusion of other parts necessary to the full appreciation of what Nishino fairly teaches or suggests to one skilled in the art. For this reason the rejection of claims 1-2, 5, 9, 10, and 12-29 as unpatentable over Onagawa in view of

Nishino should be reversed.

3. Combination of the References Does in the Manner Indicated Not Produce Appellants' Invention

Even if, for the sake of argument, it would have been obvious to use only the Nishino protrusion in Onagawa (which appellants do not concede), there is no disclosure or suggestion in either reference, or the combination thereof, that the first contact portion ("a contact of said projection and said bend portion") would exhibit a first contact pressure, that a second contact portion would exhibit a second contact pressure, and that the first contact pressure would be stronger than the second contact pressure. The position of the Office Action is that "any sealant has infinite contact portions and because of the chemical nature of all sealants it is inherent that there will be weak and strong contact portions, therefore the prior art still reads on the claims as so recited." Office action of December 14, 2005, page 2, lines 2-4. This statement misinterprets the claims.

Claim 1 recites that the "first contact portion is formed from a contact of said projection and said bend portion" and that the outer periphery end includes the projection. The caulked portion is formed "while said outer periphery end of said flange is positioned in said bend portion." Although the caulked portion includes contact portions, the claim does not recite that the caulk forms the contact portion. Instead, the "first contact portion is formed from a contact of said projection and said bend portion." Any purported contact portions of the caulk are irrelevant to an interpretation of claim 1.

The Office Action has not made the *prima facie* case. Combination of the references in the manner proposed by the Office Action does not produce the invention recited in claim 1. For this reason, the rejection of claim 1, and the claims dependent

thereon, as unpatentable over Onagawa in view of Nishino should be reversed.

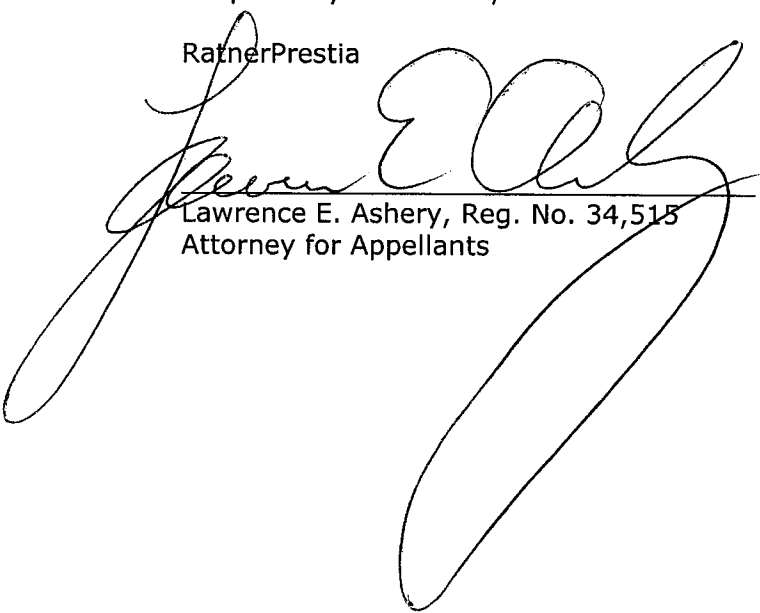
As discussed above, the other independent claims, independent claims 12, 14, 16, and 23, each recite the same or similar features to that discussed above. Therefore, for this reason, the rejection of claims 12, 14, 16, and 23, and the claims dependent thereon, should be reversed.

D. CONCLUSION

For the reasons discussed above, the rejection of claims 1-2, 5, 9, 10, and 12-29 under 35 USC 103(a) as being unpatentable over Onagawa in view of Nishino should be reversed, and such action is earnestly solicited.

Respectfully Submitted,

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Enclosure: Claims Appendix

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APPENDIX OF CLAIMS

1. A top sealing plate used for a battery, comprising:

a filter, a cap, and a valve body,

wherein said filter includes a valve hole and upper opening;

said cap has a convex portion, and a flange portion disposed around said convex portion;

an opening end of said upper opening of said filter has a bend portion;

an outer periphery end of said flange portion of said cap and said bend portion include a caulked portion that is caulked and jointed to each other;

said caulked portion is formed by caulking while said outer periphery end of said flange is positioned in said bend portion;

said valve body is disposed to cover said valve hole, in a space formed between said cap and said filter;

said caulked portion includes a first contact portion and a second contact portion between the surface of the outer periphery end of said flange and said bend portion, a contact pressure of said first contact portion is stronger than a contact pressure of said second contact portion;

said outer periphery end of said flange portion includes a projection extending from at least one out of the surface and the back thereof;

said first contact portion is formed from a contact of said projection and said bend portion; and

said cap and said filter are electrically connected to each other by the contact with said outer periphery end and said bend portion at said caulked portion.

2. The top sealing plate of claim 1,

wherein said first contact portion is one of a plurality of first contact portions, said second contact portion is one of a plurality of second contact portions, and said caulked portion includes said first contact portions and said second contact portions; and

said first contact portions and said second contact portions are disposed along the circumferential or radial direction of said cap.

3. The top sealing plate of claim 1,

wherein said top sealing plate is disposed at the opening of said battery case so as to close said battery case, in a state of being electrically insulated by said gasket; and

said filter is electrically connected to said positive electrode.

4. The top sealing plate of claim 3,

wherein said battery is cylindrical in shape;

said battery case has a circular opening;

said top sealing plate is disposed at said opening of said battery case so as to close said battery case;

said cap has a gas vent hole; and

said filter secures said valve body and said cap in predetermined positions.

5. The top sealing plate of claim 1,

wherein said projection includes at least one selected from the group consisting of a plurality of small projections, bulges, and peripheral edge projected from the surface of said flange.

6.-8. (Cancelled)

9. The top sealing plate of claim 1,

wherein said projection is disposed on the surface of said outer periphery end of said flange positioned at the same side as said convex portion.

10. The top sealing plate of claim 1,

wherein said projection has vertically spring against the contact surface between said flange portion and said bend portion.

11. (Cancelled)

12. A top sealing plate used for a battery, comprising:

a filter, a cap, and a valve body,

wherein said filter includes a valve hole and upper opening;

said cap has a convex portion, and a flange portion disposed around said convex portion;

an opening end of said upper opening of said filter has a bend portion;

an outer periphery end of said flange portion of said cap and said bend portion include a caulked portion that is caulked and jointed to each other;

said caulked portion is formed by caulking while said outer periphery end is positioned in said bend portion;

said valve body is disposed to cover said valve hole, in a space formed between said cap and said filter;

a surface of said outer periphery end of said flange has a projection;

said outer periphery end including said projection and said bend portion are caulked;

said cap and said filter are electrically connected to each other, by contact between said outer periphery end at said caulked portion and said bend portion;

the distance from a mating face of said filter and cap to the peak of said projection is greater than the thickness of said flange portion; and

each of the peaks has a stronger contact pressure against said bend portion of said filter as compared with zones other than said peaks.

13. The top sealing plate of claim 12,

wherein said projection includes at least one selected from the group consisting of a plurality of small productions, bulges, and projected peripheral edge.

14. A top sealing plate used for a battery, comprising:

a filter, a cap, and a valve body,

wherein said filter includes a valve hole and upper opening;

said cap has a convex portion, and a flange portion disposed around said convex portion;

an opening end of said upper opening of said filter has a bend portion;

an outer periphery end of said flange portion of said cap and said bend portion include a caulked portion that is caulked and jointed to each other;

said caulked portion is formed by caulking while said outer periphery end is positioned in said bend portion;

said valve body is disposed to cover said valve hole, in a space formed between said cap and said filter;

said cap and said filter are electrically connected to each other, by contact between said outer periphery end at said caulked portion and said bend portion;

said caulked portion includes an integral projection such that said outer periphery end and said bend portion are integrally projected;

said integral projection is formed by pressing a protuberant tool from above the bend portion, in a state that said outer periphery end is positioned in said bend portion; and

said integral projection has a stronger contact pressure as compared with zones other than said integral projection.

15. The top sealing plate of claim 14,

wherein said battery comprises a battery case, and a positive electrode, negative electrode, electrolyte, gasket and said top sealing plate disposed in said battery case; and

said battery case has a circular opening;

said top sealing plate is disposed at said opening of said battery case, in a state of being electrically insulated by said gasket so as to close said battery case; and

said filter is electrically connected to said positive electrode.

16. A battery, comprising:

a battery case, a positive electrode, a negative electrode, electrolyte, a gasket, and a top sealing plate,

wherein said positive electrode, said negative electrode, and said electrolyte are disposed in said battery case;

said battery case has an opening;

said top sealing plate is disposed at the opening of said battery case, in a state of being electrically insulated by said gasket so as to close said battery case;

said filter is electrically connected to said positive electrode;

said top sealing plate comprises a filter, cap, and valve body;

said filter has a valve hole and upper opening;

said cap has a convex portion, and a flange portion disposed around said convex portion;

an opening end of said upper opening of said filter has a bend portion;

an outer periphery end of said flange portion of said cap and said bend portion include a caulked portion that is caulked and joined to each other;

said caulked portion is formed by caulking while said outer periphery end is positioned in said bend portion;

said valve body is disposed to cover said valve hole, in a space formed between said cap and said filter;

said caulked portion includes a first contact portion and a second contact portion between the surface of the outer periphery end of said flange and said bend portion, a contact pressure of said first contact portion is stronger than a contact pressure of said second contact portion;

said outer periphery end of said flange portion includes a projection extending from at least one out of the surface and the back thereof;

said first contact portion is formed from a contact of said projection and said bend portion; and

said cap and said filter are electrically connected to each other, due to contact established between said outer periphery end and said bend portion at said caulked portion.

17. The battery of claim 16,

wherein said projection includes at least one selected from the group consisting of a plurality of small projections, bulges, and projected peripheral edge;

said strong contact portion is formed by said projection and said bend portion contacting with each other; and

said weak contact portion is formed by zones other than said projection and said bend portion contacting with each other.

18. The battery of claim 16,

said first contact portion is one of a plurality of first contact portions, said second contact portion is one of a plurality of second contact portions, and said caulked portion includes said first contact portions and said second contact portions; and

said first contact portions and said second contact portions are disposed along the circumferential or radial direction of said cap.

19. The battery of claim 17,

wherein the plurality of projections are disposed on the surface of said outer periphery end of said flange positioned at the same side as said convex portion.

20. The battery of claim 17,

wherein said projection has vertically spring against the contact surface between said flange portion and said bend portion.

21. The battery of claim 17,

wherein the distance from the mating face of said filter and cap to the peaks of said plurality of projections is greater than the thickness of said flange portion; and

each of said peaks has a stronger contact pressure against said bend portion of said filter as compared with zones other than said peaks.

22. The battery of claim 17,

said caulked portion includes an integral projection such that said outer periphery end and said bend portion are integrally projected;

said integral projection is formed by pressing a protuberant tool from above the bend portion, in a state that said outer periphery end is positioned in said bend portion; and

said integral projection has a stronger contact pressure as compared with zones other than said integral projection.

23. A method of manufacturing a battery, comprising the steps of:

(a) disposing a positive electrode, a negative electrode, and electrolyte in a battery case;

(b) manufacturing a top sealing plate;

(c) electrically connecting said filter and said positive electrode; and

(d) disposing said top sealing plate at the opening of said battery case via an electrical insulating gasket in order to close the opening,

wherein the step of manufacturing said top sealing plate comprises the steps of:

(1) forming a filter having a valve hole and upper opening;

(2) bending the opening end of the upper opening of said filter, to form a bend portion;

(3) forming a cap having a convex portion and a flange portion disposed around said convex portion;

(4) caulking to join the outer periphery end to said bend portion while the surface and back of the outer periphery end of said flange portion of said cap are positioned in said bend portion, to form a caulked portion; and

(5) disposing a valve body serving to cover the valve hole in a space formed between said cap and said filter, and

wherein the step of forming said cap includes forming a projection at said outer periphery end of said flange portion, said projection extending from at least one out of the surface and the back thereof; and

the step of forming said caulked portion includes a step of electrically connecting said cap and said filter to each other by contacting the outer periphery end at said caulked portion with said bend portion so that said caulked portion includes a first contact portion and a second contact portion between the surface of the outer periphery end of said flange and said bend portion, a contact pressure of said first contact portion is stronger than a contact pressure of said second contact portion.

24. The method of manufacturing a battery of claim 23,

wherein said projection includes at least one selected from the group consisting of a plurality of small projections, bulges, and projected peripheral edge;

said strong contact portion is formed by said projection and said bend portion contacting with each other; and

said weak contact portion is formed by zones other than said projection and said bend portion contacting with each other.

25. The method of manufacturing a battery of claim 23,

wherein said first contact portion is one of a plurality of first contact portions, said second contact portion is one of a plurality of second contact portions, and said caulked portion includes said first contact portions and said second contact portions; and

said first contact portions and said second contact portions are disposed along the circumferential or radial direction of said cap.

26. The method of manufacturing a battery of claim 24,

wherein said projections are disposed on the surface of the outer periphery end of said flange positioned at the same side as said convex portion.

27. The method of manufacturing a battery of claim 24,

wherein said projection has vertically spring against the contact surface between said flange portion and said bend portion.

28. The method of manufacturing a battery of claim 24,

wherein the distance from the mating face of said filter and cap to the peak of said projection is greater than the thickness of said flange portion; and

each of said peaks has a stronger contact pressure against said bend portion of said filter as compared with zones other than said peaks.

29. The method of manufacturing a battery of claim 23,

wherein the step of forming said caulked portion includes a step of forming an integral projection at said outer periphery end and said bend portion, by pressing a protuberant tool from above the bend portion while the surface and back of said flange portion of said cap are positioned in said bend portion; and

said integral projection has a stronger contact pressure as compared with zones other than the integral projection.

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IX. EVIDENCE APPENDIX

None.

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X. RELATED PROCEEDINGS APPENDIX

None.